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Overview

- Brief Introduction
 - Computer Access Intervention Process
 - Evidence-based Practice (EBP) and Its Role
- Use of Evidence in Computer Access Process
 - Pointing Devices
 - Text Entry
 - Switch Use

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Access Intervention Process

- Goal: to find the best computer access solution for an individual's needs
- Determine client needs and goals
- Assess characteristics of:
 - Client
 - Environment
 - Task
- Compare possible solutions for input & output
- Recommend particular solution
- Implement recommendation
- Measure outcomes (did we meet the goal?)

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Evidence-based Practice (EBP)

- Make decisions based on clear evidence related to the client
 - External or field evidence
 - What are published outcomes for similar clients with similar needs?
 - Knowledge and skills of the providers
 - What's worked well for similar clients that I've worked with?
 - Individual evidence
 - Functional skills assessment
 - Discussion with client
 - Trials with potential interventions

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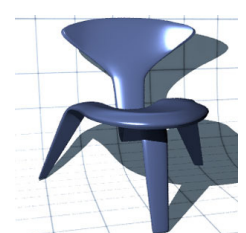
Clear Evidence uses

- Setting goals – Therapy, IEP, ...
 - Identifying needs
 - Justifying areas of work
- Funding support
- Choosing methods and techniques
- Tracking progress
- Measuring outcomes

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Evidence-based Practice (EBP)

- Observation
- Feedback
- Measurement



PKO by Poul Kjaerholm, 1952

Computer-Based Tools for Gathering Internal Evidence

- Focus on assessment of client abilities
- Present repeatable computer-related tasks in a realistic setting
- Aid in data collection and report generation
- Ideally – get the information you need, in less time!

Pointing Device Use

- Select best pointing method
 - Mice, trackballs, trackpads, head-controlled mice, keyboard-based approaches, etc.
- Configure for user's needs.
 - Location, splinting, device behavior, etc.
- Follow-along

Skills & Measures for Pointing

- Target Acquisition
 - Dwell, click, double-click
- Dragging
- Menu selection
- Speed & accuracy
- Complements observations and feedback

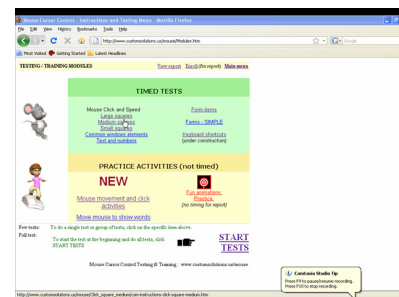
Gathering Pointing Device Evidence

- First, full disclosure...
- List of tools:
 - Custom Solutions website
 - REACH assessment tests
 - Compass software
 - Pointing Wizard

Custom Solutions website

- <http://www.customsolutions.us/mouse/>
- Free, but with some major flaws
- 8 timed tests
- Test objects always in same location
- Limited reporting

Custom Solutions website



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REACH Assessment Tools

- Included in REACH Interface Author
- 4 timed tests for pointing
- Validity problem: mouse cursor doesn't respond properly until a few seconds into each trial, so timing data are inaccurate.
- 13 second "get ready" time between each trial is too long and not adjustable

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Compass Software

- Aim, Drag, and Menu tests specifically for pointing device skills
- Text entry tests with on-screen keyboard
- Setup is highly customizable, if desired
- Validity and accuracy have been demonstrated
- Compatible with alternative inputs and outputs
- Reports and data are stored for easy review and retrieval

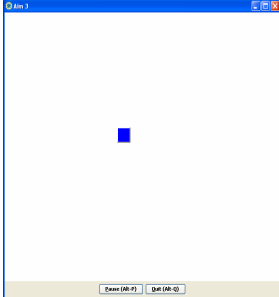
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Compass Example

- Young adult with CP performed Compass Aim tests with four different pointing devices
- Test set-up was identical for each device

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Compass Aim Test



- Measures speed and accuracy of user's target selections
- Reports averages across targets, as well as target-by-target data

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Compass Example: Results

	Trial Time (sec)	Entries
Mouse	1.9	1.2
Headtracker	3.1	1.6
Trackpad	4.6	1.2
MiniJoy	7.4	1.3

- View PDF Report...
- Control looked similar, qualitatively
- But performance was much faster with the mouse
- Provides user with means of making an informed decision

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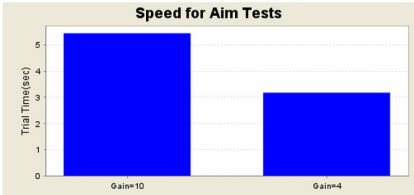
Pointing Wizard Example

- Adjusting Windows settings to meet user's needs
- Pointer speed: gain of the pointing device
- Double-click settings:
 - Double-click time
 - Double-click distance
- Object sizes: menus, caption buttons, scrollbar, taskbar
- Demo (of Part 2)

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Pointing Wizard Example

- 52 year-old man with cerebral palsy
- Slower pointer speed yielded:
 - 42% increase in speed relative to default
 - 41% decrease in entries relative to default

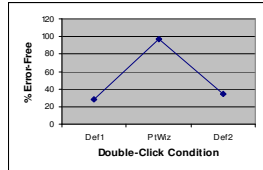


Gain	Total Time (sec)
Gain=10	~5.2
Gain=4	~3.2

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Pointing Wizard Example

- 57 year-old man with history of stroke
- With default double-click settings:
 - About 70% of double-clicks required multiple attempts
 - 7 or 8 attempts not uncommon
- With wizard-recommended settings:
 - Only 3% of double-clicks required multiple attempts
 - Double-click distance was the most important change



Condition	% Error-Free
Def1	~30
P1Wz	~100
Def2	~35

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Text Entry Device (Keyboard) Use

- Select best text entry method
 - Physical keyboard
 - Morse code
 - On-screen keyboards
- Configure for user's needs
 - Control stabilizers
 - Control extenders
 - Positioning
 - Device behavior
- Follow-along

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Skills & Measures for Text Entry

- Reliable and efficient access to all characters and functions
- Words/characters per minute (overall and with errors removed)
- Errors
- Complements observations and feedback

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Gathering Text Entry Evidence


- List of tools:
 - “Standard” typing tests
 - TextTest and StreamAnalyzer
 - Compass software
 - Keyboard Wizard

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TypingTest.com

typingtest.com

- Free
- Available on any computer with web access



- Choice of trial length and sample text

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TypingTest.com

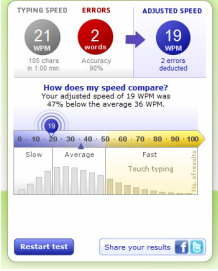
The test screen has the potential to introduce distractions



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TypingTest.com

- Limited results provided
 - WPM
 - Number of characters
 - Number of errors
 - Adjusted speed
 - Comparison to norm
- Can't save results
- Accuracy of results?




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Speedtest

speedtest.10-fast-fingers.com/


- Free
- Web access
- Choice of 21 languages
- 60 seconds per trial
- Random list of common words
- Fewer distractions



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Speedtest

- Limited results provided
 - wpm and cpm
 - Number of correct words
 - Number of wrong words
 - Relative position
 - Share results
- Can't save results
- Accuracy of results?



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Mavis Beacon Teaches Typing

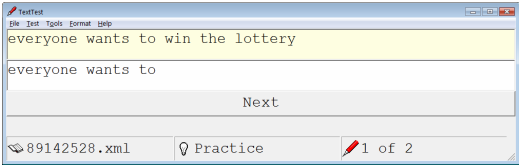
broderbund.com/c-33-mavis-beacon.aspx

- About \$20
- Intended as a tutor but includes speed tests
- “Detailed” tracking and progress reports
- Games and music
- English, French, and Spanish

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TextTest and Stream Analyzer

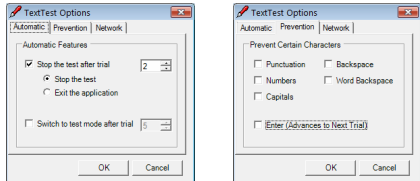
- faculty.washington.edu/wobbrock/ - Jacob O. Wobbrock
- Free
- Research tool
- Practice and test modes
- Two included phrase sets or create a custom set



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TextTest

- Define number of trials or end manually
- Limit acceptable characters



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TextTest

- Log file
 - Target text
 - Every character entered
 - ANSI keycodes
 - Time
 - Transcribed text

```
<task number="1" testing="False">
  <presented>monkey see monkey do</presented>
  <entry char="m" value="109" time="63412970107.155" />
  <entry char="o" value="111" time="63412970107.389" />
  <entry char="n" value="110" time="63412970107.654" />
  <entry char="k" value="107" time="63412970108.044" />
  <entry char="e" value="101" time="63412970109.806" />
  <entry char="y" value="121" time="63412970110.103" />
  <entry char="m" value="32" time="63412970110.368" />
  <entry char="s" value="115" time="63412970110.898" />
  <entry char="s" value="115" time="63412970111.148" />
  <entry char="d" value="8" time="63412970113.82" />
  <entry char="e" value="101" time="63412970113.426" />
  <entry char="m" value="32" time="63412970114.393" />
  <entry char="m" value="109" time="63412970115.079" />
  <entry char="o" value="111" time="63412970115.282" />
  <entry char="n" value="110" time="63412970115.516" />
  <entry char="k" value="107" time="63412970115.765" />
  <entry char="e" value="101" time="63412970116.436" />
  <entry char="y" value="121" time="63412970116.67" />
  <entry char="m" value="32" time="63412970116.951" />
  <entry char="d" value="100" time="63412970116.386" />
  <entry char="o" value="111" time="63412970115.187" />
  <entry char="o" value="111" time="63412970119.603" />
  <entry char="d" value="8" time="63412970120.133" />
</transcribed>monkey see monkey do</transcribed>
```

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StreamAnalyzer

Num	Testing?	Time	WPM	AdjWPM	CPS	KSPS	GPS	Intra	Inter	StrDist	M
1	0	34.188	11.583	11.293	0.965	1.258	1.293	0.6309546	0.1598864		
2	1	21.532	14.49	13.997	1.208	1.393	1.489	0.531258	0.1834839	1	

- Trial number
- Test or practice
- Total time for trial
- WPM
- WPM adjusted with errors
- Characters per second
- Keystrokes per second
- Gestures per character
- Average time per character
- Average time between characters
- Plus 24 more

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StreamAnalyzer

- Two character-level tables with insertions, substitutions, omissions, and deletions all showing both uncorrected and corrected
- Confusion matrix showing intended and produced characters

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Compass Software

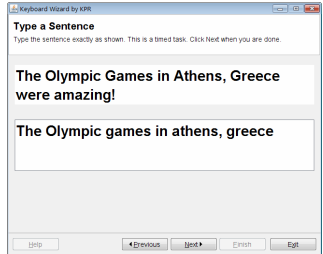
- Letter, word, and sentence tests specifically for text entry skills
- Setup is highly customizable, if desired
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Keyboard Wizard

Recommends adjustments to Windows settings to meet users' needs

- StickyKeys
- Repeat settings
 - Rate
 - Delay



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Text Entry Example

- 68 y/o woman with multiple sclerosis
- Reports some difficulty with typing
- Run through Keyboard Wizard (demo)
- Adjusting auto-repeat setting:
 - Improved typing speed 50% (from 2.2 to 3.2 wpm)
 - Reduced errors 32 pp (from 60% errors to 28%)

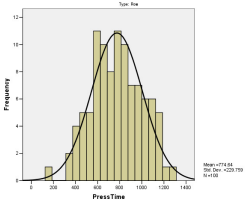
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Single-Switch Scanning

- Select best switch
 - Activation method
 - Location
- Configure scanning software
 - Scan rate

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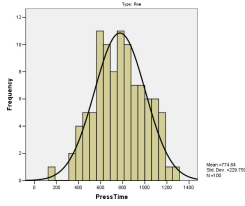
Choosing the Switch



- Goal
 - Consistent activation time
 - Normal distribution

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Setting the Scan Delay



- Precise method
 - Scan delay = mean switch press time + (2 * std dev)
- .65 rule
 - Scan delay = mean / .65
- Both accommodate about 97.5% of switch presses

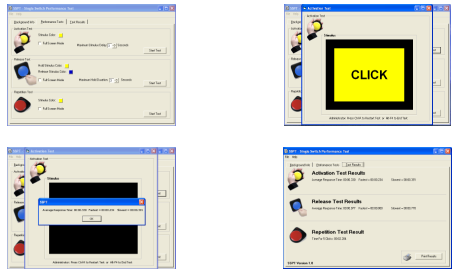
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Single Switch Performance Test

- Free!
 - www.aacoinstitute.org
- Three tests
 - Activation
 - Release
 - Repetition

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Single Switch Performance Test



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REACH Assessment Tools

- Included in REACH Interface Author
 - www.ahf-net.org
- Three tests
 - Click
 - Double-Click
 - Release

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REACH Interface Author



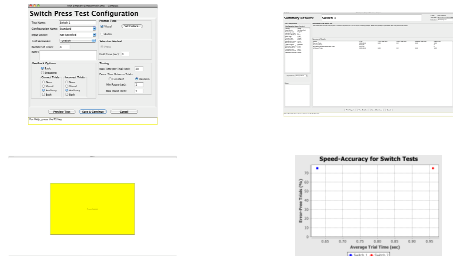
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Compass

- Two tests
 - Switch
 - Scan


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Compass



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Compass



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Benefits of using Quantitative Methods

- With the right tools, it requires no extra time
- Stronger basis for decisions → Better decisions
- Clearer justification for decisions
- More “power” to the user - clients themselves often really appreciate seeing data about their performance
- Give one of these tools a try, if you haven’t already



Contact Information

Quantitative Approaches to Computer Access

Rich Simpson, PhD, ATP

University of Pittsburgh
School of Health and Rehabilitation Sciences
Bakery Square, Suite 401, Room 15
6425 Penn Avenue
Pittsburgh, PA 15206 US
412-383-6593

Glen Ashlock, MS, ATP

Ann Arbor Center for Independent Living
Ann Arbor, MI
glen@aacil.org

Heidi Koester, PhD

Koester Performance Research
Ann Arbor, MI
www.kpronline.com
hbk@kpronline.com